INSTITUTO POLITÉCNICO DE TOMAR

ESCOLA SUPERIOR DE TECNOLOGIA DE TOMAR

ENGENHARIA INFORMÁTICA

REDES DE DADOS II

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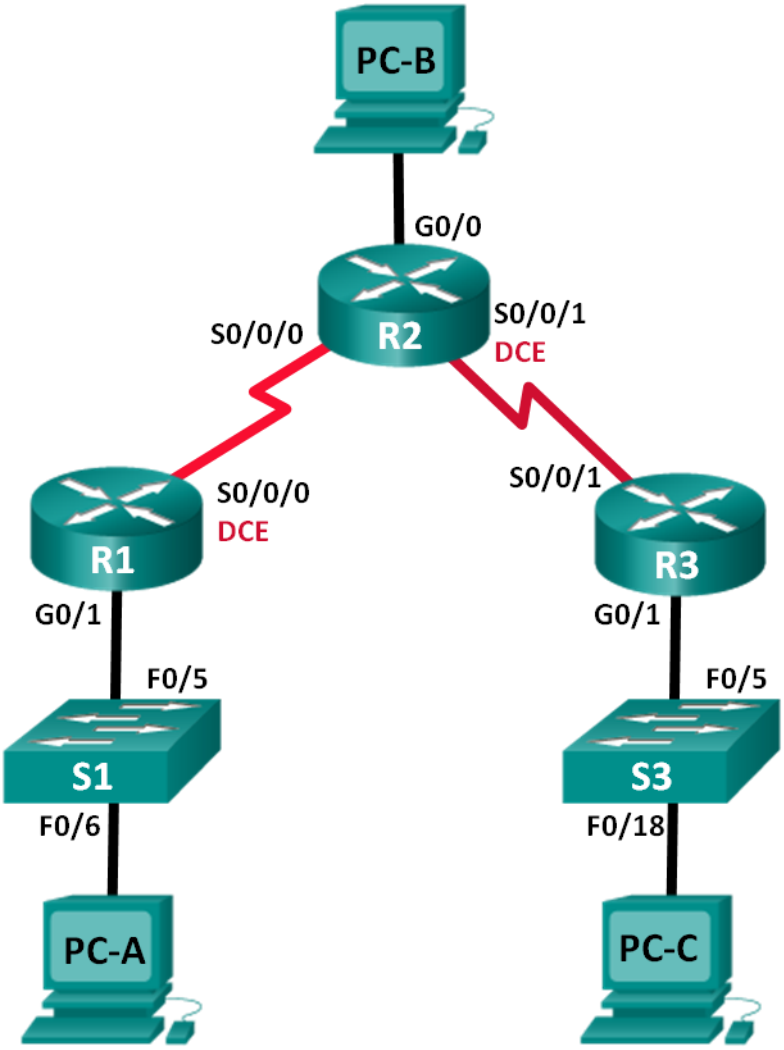
Trabalho Laboratorial 2: Configuring Basic RIPv2

Based on Cisco CCNA lab guide.

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/1	172.30.10.1	255.255.255.0	N/A
	S0/0/0 (DCE)	10.1.1.1	255.255.255.252	N/A
R2	G0/0	209.165.201.1	255.255.255.0	N/A
	S0/0/0	10.1.1.2	255.255.255.252	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A
R3	G0/1	172.30.30.1	255.255.255.0	N/A
	S0/0/1	10.2.2.1	255.255.255.252	N/A
S1	N/A	VLAN 1	N/A	N/A
S3	N/A	VLAN 1	N/A	N/A
PC-A	NIC	172.30.10.3	255.255.255.0	172.30.10.1
PC-B	NIC	209.165.201.2	255.255.255.0	209.165.201.1
PC-C	NIC	172.30.30.3	255.255.255.0	172.30.30.1

Objectives

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Configure and Verify RIPv2 Routing

- Configure RIPv2 on the routers and verify that it is running.
- Configure a passive interface.
- Examine routing tables.
- Disable automatic summarization.
- Configure a default route.
- Verify end-to-end connectivity.

Background / Scenario

RIP version 2 (RIPv2) is used for routing of IPv4 addresses in small networks. RIPv2 is a classless, distance-vector routing protocol, as defined by RFC 1723. Because RIPv2 is a classless routing protocol, subnet masks are included in the routing updates. By default, RIPv2 automatically summarizes networks at major network boundaries. When automatic summarization has been disabled, RIPv2 no longer summarizes networks to their classful address at boundary routers.

In this lab, you will configure the network topology with RIPv2 routing, disable automatic summarization, propagate a default route, and use CLI commands to display and verify RIP routing information.

Note: Depending on the model and Cisco IOS version, the commands available and output produced might vary from what is shown in this lab. Refer to the Router Interface Summary Table at the end of the lab for the correct interface identifiers.

Note: Make sure that the routers and switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

Required Resources

- 3 Routers (Cisco 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
- 2 Switches (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
- 3 PCs (Windows 7, Vista, or XP with terminal emulation program, such as Tera Term)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet and Serial cables as shown in the topology

Part 1: Build the Network and Configure Basic Device Settings

In Part 1, you will set up the network topology and configure basic settings.

Step 1: Cable the network as shown in the topology.

Step 2: Initialize and reload the router and switch.

Step 3: Configure basic settings for each router.

a. Disable DNS lookup.
b. Configure device names as shown in the topology.
c. Configure password encryption.
d. Assign **class** as the privileged EXEC password.
e. Assign **cisco** as the console and vty passwords.
f. Configure a MOTD banner to warn users that unauthorized access is prohibited.
g. Configure **logging synchronous** for the console line.
h. Configure the IP addresses listed in the Addressing Table for all interfaces.
i. Configure a description for each interface with an IP address.
j. Configure the clock rate, if applicable, to the DCE serial interface.
k. Copy the running-configuration to the startup-configuration.

Step 4: Configure PC IP Addressing.

Refer to the Addressing Table for IP address information of the PCs.

Step 5: Test connectivity.

At this point, the PCs are unable to ping each other.

a. Each workstation should be able to ping the attached router. Verify and troubleshoot if necessary.
b. The routers should be able to ping one another. Verify and troubleshoot if necessary.

Part 2: Configure and Verify RIPv2 Routing

In Part 2, you will configure RIPv2 routing on all routers in the network and then verify that the routing tables are updated correctly. After RIPv2 has been verified, you will disable automatic summarization, configure a default route, and verify end-to-end connectivity.

Step 1: Configure RIPv2 routing.

a. Configure RIPv2 on R1, R2 and R3 as the routing protocol and advertise the appropriate connected networks.

Note: The **passive-interface** command stops routing updates out the specified interface. This process prevents unnecessary routing traffic on the LAN. However, the network that the specified interface belongs to is still advertised in routing updates that are sent out across other interfaces. Passive-interface must be configured whenever it makes sense. On R2 do not advertise the 209.165.201.0 network.

Step 2: Examine the current state of the network.

a. The status of the two serial links can quickly be verified using the **show ip interface brief** command on R2.

```
R2# show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
Embedded-Service-Engine0/0 unassigned      YES unset  administratively down down
GigabitEthernet0/0         209.165.201.1   YES manual up                    up
GigabitEthernet0/1         unassigned      YES unset  administratively down down
Serial0/0/0                10.1.1.2        YES manual up                    up
Serial0/0/1                10.2.2.2        YES manual up                    up
```

b. Check connectivity between PCs.

From PC-A, is it possible to ping PC-B? _____ Why?

_____

From PC-A, is it possible to ping PC-C? _____ Why?

_____

From PC-C, is it possible to ping PC-B? _____ Why?

_____

From PC-C, is it possible to ping PC-A? _____ Why?

_____

c. Verify that RIPv2 is running on the routers.

You can use the **debug ip rip**, **show ip protocols**, and **show run** commands to confirm that RIPv2 is running.

When issuing the **debug ip rip** command on R2, what information is provided that confirms RIPv2 is running?

_____

When you are finished observing the debugging outputs, issue the **undebug all** command at the privileged EXEC prompt.

When issuing the **show run** command on R3, what information is provided that confirms RIPv2 is running?

_____

_____

d. Examine the routing tables. Use the command show ip route to display the routing tables. According to the outputs there are connectivity between all networks?

Note: Use the **debug ip rip** command on R2 to determine the routes received in the RIP updates from R3 and list them here.

Step 3: Disable automatic summarization.

a. The **no auto-summary** command is used to turn off automatic summarization in RIPv2. Disable auto summarization on all routers. The routers will no longer summarize routes at major classful network boundaries. R1 is shown here as an example.

```
R1(config)# router rip
R1(config-router)# no auto-summary
```

b. Issue the **clear ip route *** command to clear the routing table.

```
R1(config-router)# end
R1# clear ip route *
```

c. Examine the routing tables. Remember that it will take some time to converge the routing tables after clearing them.

d. Use the **debug ip rip** command on R2 to examine the RIP updates.

```
R2# debug ip rip
```

After 60 seconds, issue the **no debug ip rip** command.

What routes are in the RIP updates that are received from R3?

_____

Are the subnet masks included in the routing updates? _____

Step 4: Configure and redistribute a default route for Internet access.

a. From R2, create default route to forward any traffic with an unknown destination address to PC-B at 209.165.201.2, simulating the Internet by setting a Gateway of Last Resort on router R2.

```
R2(config)# ip route 0.0.0.0 0.0.0.0 209.165.201.2
```

b. Configure R2 to advertise the default route to the other routers.

Step 5: Verify the routing configuration.

a. View the routing table on R1.

How can you tell from the routing table that the subnetted network shared by R1 and R3 has a pathway for Internet traffic?

_____

_____

b. View the routing table on R2.

How is the pathway for Internet traffic provided in its routing table?

_____

_____

Step 6: Verify connectivity.

a. Simulate sending traffic to the Internet by pinging from PC-A and PC-C to 209.165.201.2.

Were the pings successful? _____

b. Verify that hosts within the subnetted network can reach each other by pinging between PC-A and PC-C. Were the pings successful? _____

Reflection

1. Why would you turn off automatic summarization for RIPv2?

   _____

2. How did R1 and R3 learn the pathway to the Internet?

   _____

Router Interface Summary Table

Router Interface Summary				
Router Model	**Ethernet Interface #1**	**Ethernet Interface #2**	**Serial Interface #1**	**Serial Interface #2**
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)

Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.